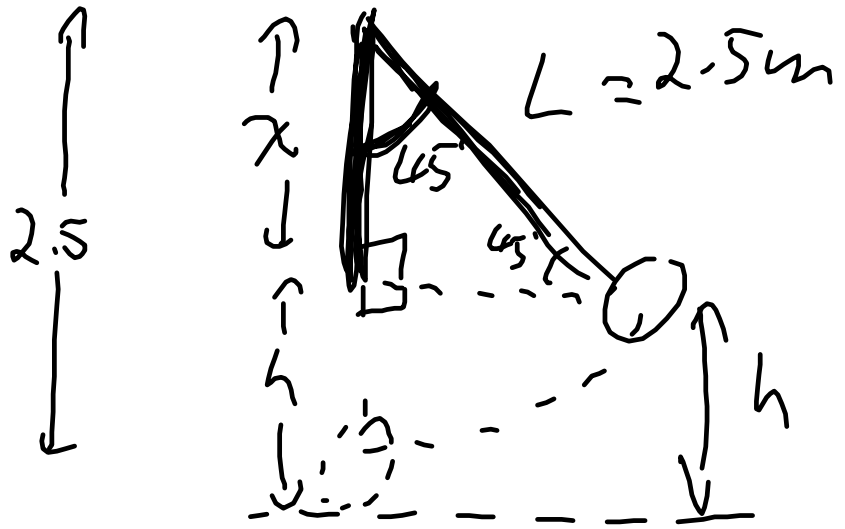
Go over Homework 221-226
Look at roller coaster problem
p224
Q8

$E_g = mgh$



SOHCAHTOA

$\cos 45 = \frac{x}{L}$

$x = L \cos 45$

$x = 1.76777\text{m}$

$h = L - x = 2.5 - 1.768$

$E_g = mgh$

$= 7.26\text{kg}\left(9.80\frac{N}{kg}\right)(0.732)$

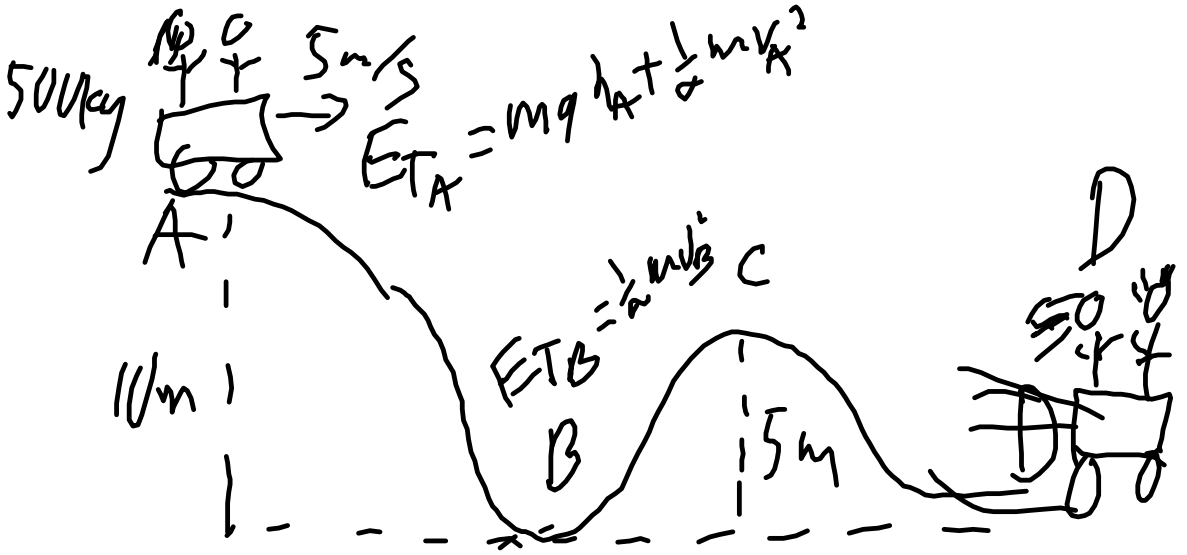
a) $= \boxed{52\text{ J}}$

b) Lowest part of the swing.

Roller Coaster Question:

You are on a roller coaster car, total mass of 500.0kg, at the top of a 10.0 m high hill moving at 5.00 m/s.

a) what is your initial gravitational energy? mgh
b) what is your initial kinetic energy? $\frac{1}{2}mv^2$
c) What is your initial total energy? $E_g + E_K$ ← B
d) What is your speed at i) the bottom of the hill, ii) the top of the next hill, 5.00m high iii) the bottom of that hill. ← D ↖ C
e) If your speed at the end is only 12.0 m/s, how much energy was lost? Where did it go? ← D



15 minutes - CR on p 226
p230-235 Q 9-16 - 15 hard

Big Idea

energy is conserved

$E_{TA} = E_{TB}$

$mgh_A + \frac{1}{2}mv_A^2 = \frac{1}{2}m(v_B)^2 + E_{Lost}$

a) Eg=mgh=500.0kgx9.80N/kgx10.0m
= 49000J = 4.90×10^4J

b) $E_k = 1/2mv^2$ = 1/2 x 500.0kg x $(5.00m/s)^2$
= 6 250 J = 6.25×10^3J

c) E_{Total} = Eg + Ek = 49000J + 6 250 J
= 5.52×10^4J 49000+6250=55250

d) $E_{Total\ A} = E_{Total\ B}$
55250J = 1/2 500kg v^2
v = sqrt(2x55250/500)=14.86606874731851
v=14.9 m/s
$vf^2 = vi^2 + 2ad$ - also works here

at C
$E_{Total\ A} = E_{Total\ C}$
55250J = Eg + Ek
55250J = 500kg x 9.80N/kg x 5.00m +
1/2(500kg) v^2
500x9.8x5=24,500
55250-24500=30750 = 1/2 500 v^2
v = sqrt(2x30750/500)=11.09053650640942
v = 11.1 m/s

at D - same height, so if no energy is lost, you will be at the same speed at B, 14.9m/s

e) the energy lost must be included in our energy equation

$E_{Total\ A} = E_{Total\ D}$

$55250J = 1/2\ mv^2 + E_{Lost}$

$55250J = 1/2\ (500kg)(12.0m/)^2 + E_{lost}$

$E_{lost} = 55250-(0.5x500x12x12)=19250$

$1.92 \times 10^4 J$ of energy are lost.

Quiz Tuesday

Homework: p230-235 problems 9-16

q 15 is hard - both kinetic energy and momentum are conserved - 2 equations to solve.